

Response

Dear Editors:

We appreciate Dr. Aksoy's response to our paper and the specific data it provides regarding the methodology used in his studies to calculate leukemia incidence and to estimate benzene concentrations to which his cohort of Turkish shoe, slipper, and handbag workers was exposed. It is without question that Dr. Aksoy's early epidemiologic observations of the association between benzene exposure and leukemia are to be commended. The major conclusion of our review, however, was that the Aksoy studies, as well as some of the other available benzene epidemiologic studies, are not optimal for risk assessment, due primarily to limitations in quantitative exposure information. Given that individual exposure history data were not apparently available for workers in the Aksoy study, it remains our judgment that it provides a less useful basis for the estimation of a dose-response relationship than the Rinsky et al. study that we selected.

SUSAN M. BRETT
JOSEPH V. RODRICKS
ENVIRON Corporation
4350 North Fairfax Drive
Arlington, VA 22203

VERNON M. CHINCHILLI
Medical College of Virginia

Other Factors in Leukemia

Dear Editors:

In their interesting paper "Consistencies and Inconsistencies Underlying the Quantitative Assessment of Leukemia Risk from Benzene Exposure," Lamm et al. (1) discussed the results of our paper concerning the distribution of the types of leukemia in chronic benzene toxicity. According to Lamm et al., 43 (84%) of 51 cases of leukemia in my series with chronic benzene toxicity had acute myelocytic leukemia (AML) (2). Unfortunately, there is an important mistake in this calculation. As can be seen easily from the paper concerning 51 leukemic shoeworkers with chronic benzene toxicity, only 20 (39.25%) had AML (2). The remaining were acute lymphoblastic leukemia, 5 shoeworkers (9.8%); preleukemia, 7 (13.75%); acute erythroleukemia, 10 (19.6%); acute myelomonocytic leukemia, 4 (7.85%); acute monocytic leukemia, 1 (1.95%); acute undifferentiated leukemia, 1 (1.95%); and chronic myeloid leukemia, 2 (3.9%). On the other hand, it is a matter of fact that there are significant differences concerning the distribution of the types of leukemia in several studies on this hematologic malignancy associated with chronic benzene exposure. In one group, acute types of leukemia predominate, as seen in Vigliani and Forni (3), Aksoy et al. (2), Infante et al. (4), and Yin et al. (5)

series. Contrary to these, in series of Tareef et al. (6), Goguel et al. (7), and Browning, who collected series from the literature (8), chronic types of leukemia take the first place in the series of leukemia due to chronic benzene toxicity. Considering the above-mentioned striking differences, we suggested that these findings may be partly explained by exposure levels, the mode of exposure, and the presence or absence of other homologs of benzene such as toluene and xylene or other chemicals (9).

REFERENCES

1. Lamm, S. H., Walters, A. S., Wilson, R., Bryd, D. M., and Grunwald, H. Consistencies and inconsistencies underlying the quantitative assessment of leukemia risk from benzene exposure. *Environ. Health Perspect.* 82: 289-297 (1989).
2. Aksoy, M. Malignancies due to occupational exposure to benzene. *Am. J. Ind. Med.* 7: 395-402 (1985).
3. Vigliani, E. C., and Forni, A. Benzene and leukemia. *Environ. Res.* 122-127 (1976).
4. Infante, P. F., Rinsky, R. A., Wagoner, J. K., and Young, R. J. Leukemia in benzene workers. *Lancet* ii: 76-78 (1977).
5. Yin, S. N., Li, G. L., Tain, F. D., Fu, Z. I., Jin, C., Chen, Y. Z., Luo, S. J., Ye, P. Z., Zhang, J. Z., Wang, G. C., Zhang, X. C., Wu, H. N., and Zhong, Q. C. Leukemia in benzene workers. A retrospective cohort study. *Br. J. Ind. Med.* 44: 124-128 (1987).
6. Tareef, E. M., Kontchalovskaya, N. M., and Zorina, L. A. Benzene leukemias. *Acta Unio Int. Contra Cancrum* 19: 751-755 (1963).
7. Goguel, A., Cavigneaux, A., and Bernard, J. Le leucemices benzenique de la region Parisienne, 1950 et 1965. (Etude de 50 observations). *Nov. Rev. Fr. Hemat.* 7: 421-441 (1967).
8. Browning, E. Toxicity and Metabolism of Industrial Solvents. Elsevier, Amsterdam, 1965, pp. 3-65.
9. Aksoy, M. Chronic lymphoid leukaemia and hairy cell leukaemia due to chronic exposure to benzene: report of three cases. *Br. J. Haematol.* 66: 209-211 (1987).

MUZAFFER AKSOY
Department of Biology
Marmara Scientific and
Industrial Research Center
P. O. Box 21
41470 Gebze-Kocaeli
Turkey

Response

Dear Editors:

We are pleased to hear from the distinguished Professor Muzaffer Aksoy who has contributed greatly to the literature on benzene and leukemia. He has raised a number of questions concerning our review (1) and analysis of the epidemiological studies of benzene and leukemia. In our review, we analyzed the set of published population-based studies of leukemia (case count five or greater) among benzene-exposed workers. We included all the studies that (a) indicated the size and definition of the population studied, (b) commented on the characteristics of the benzene exposure, and (c) appeared to have identified all the cases within their studied population. The second group of studies that